Trend Study 22-9-03

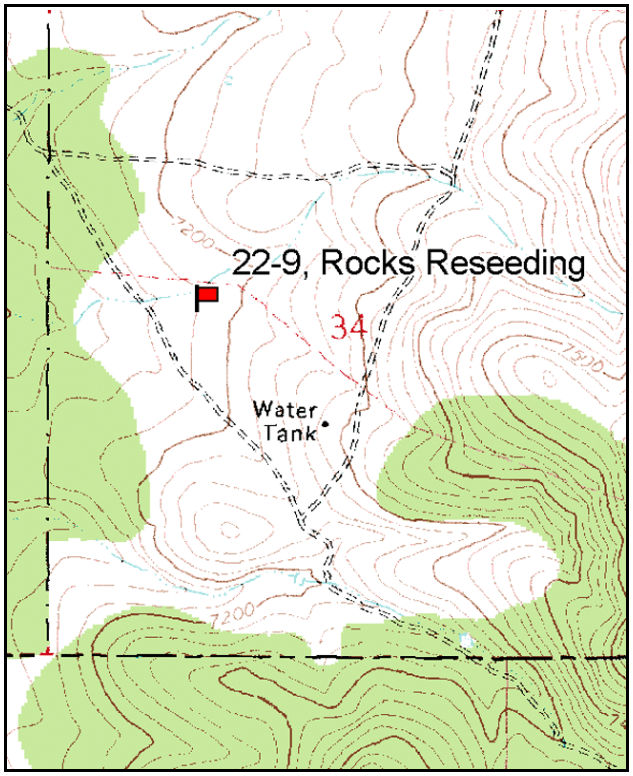
Study site name: Rocks Reseeding . Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 163 degrees magnetic. Lines 3-4 116° M.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

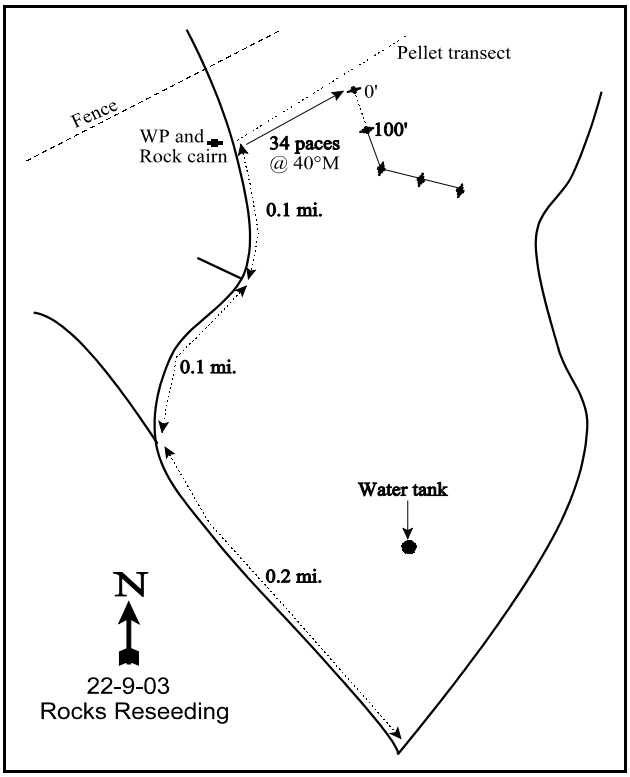
LOCATION DESCRIPTION

Begin on I-15 at exit #100, 9 miles south of Beaver. On the east side of the freeway there is a frontage road and a road going straight east. Go east 6.3 miles up Fremont Wash to a faint road to the left. Go 0.6 miles up the road which has several switchbacks to the top to a gate. Continue straight for 0.7 miles to a four-way intersection. Go straight 0.65 miles to a fork. Take the middle fork (right) for 1.0 mile and turn left under a stock pond. Go up a steep hill 0.1 miles to a fork, turn left, and go 0.2 miles to another fork. Stay right and go another 0.1 mile to a fork. Keep right and continue 0.1 miles to a witness post on the left side of the road. The witness post marks the start of a pellet group transect. From the witness post, walk 34 paces at 41 degrees magnetic along the transect. There are small rebar every 30 feet. The baseline starts 10 feet south of the fifth small rebar (150 feet from the fencepost). The frequency baseline is marked by 2-3 foot rebar and the 0-foot stake is tagged #7050. The 200, 300 and 400 foot stakes are half-high fenceposts.



Map Name: Kane Canyon

Township 30S , Range 6W , Section 34



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4223919 N, 366456 E

DISCUSSION

Rocks Reseeding - Trend Study No. 22-9

This study is located on USFS administered land that has basically been developed for livestock grazing. The site has an elevation of 7,200 feet with a westerly aspect and a 4-6% slope. The area was Dixie harrowed in 1962, followed by large areas being seeded with mostly crested wheatgrass. There were numerous water developments and fencing projects completed. A water trough is located about 1/3 of a mile from the site. There is a healthy stand of mountain big sagebrush and antelope bitterbrush with a low density of Utah juniper scattered throughout the community. Point-centered quarter data estimated 60 juniper trees/acre in 2003. A pellet group transect read on site in 1998 estimated light use at 18 deer days use/acre (44 ddu/ha) and 20 cow days use/acre (49 cdu/ha). Pellet group transect data in 2003 estimated 23 deer, 6 elk, and 19 cow days use/acre (56 ddu/ha, 15 edu/ha, and 47 cdu/ha). This transect lies in the Circleville cattle allotment which is on a 3 year rest rotation system. In the first year, cattle graze the area from June 1 to July 24. In the second year, cattle graze from July 24 through October 15. The pasture is then rested in the third year.

Soil analysis indicates texture to be a clay loam with a neutral pH (6.6). Soils have moderate depth with an average effective rooting depth estimated at 13 inches. Rock and pavement cover are moderate on the soil surface and appear to be from basaltic parent material. Moderately high pedestalling provides the most evidence of past soil erosion, but at the present time, erosion is slight. An erosion condition class assessment rated soils as stable in 2003. Bare ground increased from 21% to 30% between 1998 and 2003, while litter cover declined from 43% to 27% over the same time period.

The browse component is a mixture of mountain big sagebrush and antelope bitterbrush. Bitterbrush is the most preferred species and the mature plants have been moderate to heavily browsed. Density of bitterbrush numbered 1,440 plants/acre in 1998 and 1,080 in 2003. The proportion of the population classified as young has steadily declined since the first reading. Percent decadence was low in 1985 and 1998 at around 10%, although very high in 1991 and 2003 at nearly 60%. Bitterbrush annual leaders averaged 2.2 inches of growth in 2003. Mountain big sagebrush density was estimated at 3,420 plants/acre in 1998 and 2,880 plants/acre in 2003. The main difference in density between 1998 and 2003 was a decline in the number of young in 2003. Utilization has been mostly light to moderate in all surveys, and vigor has been generally good. Percent decadence was moderate in 1985 and 1991 at around 30%. It has declined to 8% in 1998 and then went up slightly to 17% in 2003. Annual leader growth for sagebrush averaged 1.6 inches by June 2003.

Crested wheatgrass is by far the dominant herbaceous species on the site for all readings. Crested wheatgrass provided nearly 100% of the grass cover in both 1998 and 2003. It was found in 88% of the quadrats for all years it was sampled. In 2003, crested wheatgrass had received minimal use at the time of sampling. Other perennial grasses sampled on the site included bluebunch wheatgrass, mutton bluegrass, galleta, and prairie junegrass. All of these species occur in very low numbers. Forbs have been sparse in all years. Annual forbs increased in 2003, while perennials were stable. Longleaf phlox was the most common perennial forb in all surveys. Foothill deathcamas, desert Indian paintbrush, and milkvetch all have shown signs of utilization in the past.

1985 APPARENT TREND ASSESSMENT

There is some soil loss from the site, but protection provided by the vegetative cover helps to curtail erosion. The rest-rotation grazing system should allow the grasses to remain vigorous and productive and also allow some buildup of litter. Grazing pressure on the area by cattle should be closely monitored to insure they do not feed excessively on the bitterbrush during dry years, which is already utilized by deer and is a key species that should remain in the community. Vegetative trend appears up until the density of juniper becomes too high.

1991 TREND ASSESSMENT

There has obviously been some soil movement on the site with rock and pavement cover declining from 27% to 19% and percent bare ground more than doubling to 27%. Vegetative basal cover and litter cover have both declined. Trend for soil is down. Trend for browse is mixed as mountain big sagebrush increased and bitterbrush decreased. Bitterbrush's biotic potential (number of seedlings) has decreased along with the percentage of individuals in the young age class. Another critical parameter is that percent decadence for bitterbrush has risen from 9% to 56%. The biotic potential for sagebrush is still high at 70% and the young age class is also high at 21%. Trend for browse is stable. Trend for the herbaceous understory is down for both grasses and forbs even with the rest-rotation grazing system in place. The extended drought has seized control of this grazing program. The forbs have never been very abundant on this site, with many of them having disappeared since the last survey.

TREND ASSESSMENT
soil - down (1)
browse - stable (3)
herbaceous understory - down (1)

1998 TREND ASSESSMENT

The soil trend is stable with a slight increase in percent rock and pavement cover and a slight decrease in percent bare ground. Erosion is currently negligible. The browse trend is slightly upward with a decrease in percent decadence and an increase in the percentage of plants with good vigor for both key browse species. The bitterbrush population is recovering from high percent decadence in 1991 and appears to be healthy. The herbaceous understory trend is stable with a slight decrease in grass sum of nested frequency and a slight increase in forb sum of nested frequency.

TREND ASSESSMENT
soil - stable (3)
browse - slightly up (4)
herbaceous understory - stable (3)

2003 TREND ASSESSMENT

Trend for soil is slightly down. A decrease in litter cover and resultant increase in bare ground provides less protective cover for soils. Soils show slight erosion. Trend for the browse component is slightly down. Mountain big sagebrush and bitterbrush both show some losses, and fewer young in their populations. Both species have increased decadence, with a high increase for bitterbrush. Both species have maintained generally good vigor, although 76% of the bitterbrush sampled displayed heavy use. Trend for the herbaceous understory is stable. Crested wheatgrass shows a slight decline in nested frequency but the loss is not significant. All other perennial species, both grasses and forbs, remains very low.

TREND ASSESSMENT
soil - slightly down (2)
browse - slightly down (2)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Management unit 22 , Study no: 9

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
G	Agropyron cristatum	$_{ab}$294	$_{a}$258	$_{b}$301	$_{ab}$265	22.16	15.03
G	Agropyron spicatum	$_{b}$77	$_{b}$60	$_{a}$9	$_{a}$3	.56	.02
G	Aristida purpurea	-	-	2	1	.03	.03
G	Bromus tectorum (a)	-	-	-	1	-	.00
G	Hilaria jamesii	-	-	3	-	.03	-
G	Koeleria cristata	$_{ab}$4	$_{b}$8	$_{a}$-	$_{ab}$4	-	.01
G	Oryzopsis hymenoides	4	-	1	1	.03	.03
G	Poa fendleriana	$_{c}$51	$_{b}$20	$_{a}$3	$_{a}$1	.15	.00
G	Poa secunda	-	-	-	3	-	.09
Total for Annual Grasses		0	0	0	1	0	0.00
Total for Perennial Grasses		430	346	319	278	22.96	15.22
Total for Grasses		430	346	319	279	22.96	15.22
F	Agoseris glauca	-	-	1	1	.03	.00
F	Alyssum alyssoides (a)	-	-	-	2	-	.00
F	Arabis demissa	$_{b}$8	$_{a}$-	$_{ab}$3	$_{ab}$3	.00	.03
F	Astragalus convallarius	2	-	3	-	.15	-
F	Astragalus spp.	1	-	6	5	.33	.01
F	Castilleja chromosa	3	-	-	-	-	-
F	Calochortus nuttallii	-	-	-	3	-	.00
F	Chaenactis douglasii	3	-	-	1	-	.00
F	Collinsia parviflora (a)	-	-	$_{a}$1	$_{b}$19	.00	.04
F	Crepis acuminata	-	-	-	1	-	.03
F	Cryptantha spp.	-	-	-	1	-	.00
F	Cymopterus spp.	$_{a}$-	$_{a}$-	$_{ab}$2	$_{b}$11	.01	.03
F	Delphinium nuttallianum	-	-	5	6	.04	.01
F	Descurainia pinnata (a)	-	-	2	-	.00	-
F	Draba spp. (a)	-	-	2	2	.00	.00
F	Erigeron spp.	4	-	-	-	-	-
F	Eriogonum racemosum	-	-	2	-	.03	-
F	Gayophytum ramosissimum(a)	-	-	-	5	-	.01
F	Lactuca serriola	-	-	1	-	.00	-
F	Lomatium spp.	2	1	4	-	.01	-
F	Microsteris gracilis (a)	-	-	$_{a}$9	$_{b}$166	.02	1.63
F	Navarretia intertexta (a)	-	-	-	1	-	.00
F	Phlox longifolia	51	37	32	30	.18	.11

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
F	Ranunculus testiculatus (a)	-	-	-	8	-	.01
F	Trifolium spp.	3	-	-	1	-	.00
F	Vicia americana	-	-	3	-	.03	-
F	Zigadenus paniculatus	-	-	3	-	.00	-
Total for Annual Forbs		0	0	14	203	0.03	1.71
Total for Perennial Forbs		77	38	65	63	0.84	0.27
Total for Forbs		77	38	79	266	0.88	1.99

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 22 , Study no: 9

Type	Species	Strip Frequency		Average Cover %	
		'98	'03	'98	'03
B	Artemisia tridentata vaseyana	84	74	14.66	12.76
B	Juniperus osteosperma	5	5	.15	.48
B	Pinus edulis	1	1	-	.15
B	Purshia tridentata	48	42	12.26	9.76
Total for Browse		138	122	27.07	23.15

CANOPY COVER, LINE INTERCEPT --
Management unit 22 , Study no: 9

Species	Percent Cover	
	'98	'03
Artemisia tridentata vaseyana	-	13.66
Juniperus osteosperma	.60	2.04
Pinus edulis	-	.16
Purshia tridentata	-	10.83

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 22 , Study no: 9

Species	Average leader growth (in)
	'03
Artemisia tridentata vaseyana	1.6
Purshia tridentata	2.2

POINT-QUARTER TREE DATA --
Management unit 22 , Study no: 9

Species	Trees per Acre	
	'98	'03
Juniperus osteosperma	54	60

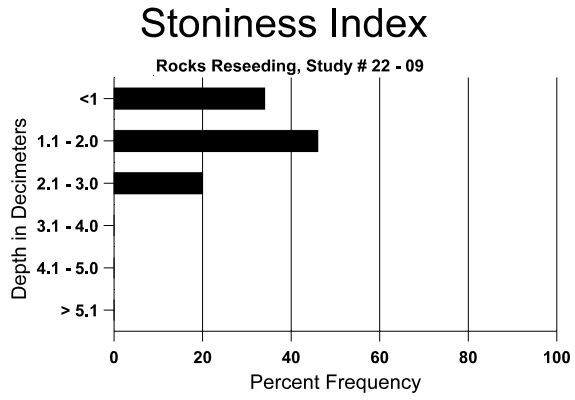
Average diameter (in)	
'98	'03
4.8	4.6

BASIC COVER --
Management unit 22 , Study no: 9

Cover Type	Average Cover %			
	'85	'91	'98	'03
Vegetation	10.25	8.25	39.93	40.48
Rock	12.50	11.75	11.52	10.52
Pavement	14.00	6.75	11.13	9.10
Litter	50.00	45.50	42.81	27.09
Cryptogams	0	1.00	.45	.15
Bare Ground	13.25	26.75	21.22	30.40

SOIL ANALYSIS DATA --
Management unit 22, Study no: 9, Study Name: Rocks Reseeding

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
13.1	63.8 (13.2)	6.6	38.0	31.4	30.6	2.5	9.8	185.6	0.7



PELLET GROUP DATA --
Management unit 22 , Study no: 9

Type	Quadrat Frequency	
	'98	'03
Rabbit	23	4
Elk	2	-
Deer	21	7
Cattle	18	9

Days use per acre (ha)	
'98	'03
-	-
1 (2)	6 (15)
18 (45)	23 (56)
20 (49)	19 (47)

BROWSE CHARACTERISTICS --
Management unit 22 , Study no: 9

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana											
85	**1933**	2733	200	1200	533	-	48	3	28	0	28/27
91	**2199**	1533	466	1000	733	-	36	6	33	15	25/31
98	**3420**	340	900	2240	280	460	18	1	8	2	27/37
03	**2880**	20	340	2040	500	240	21	8	17	3	25/31
Chrysothamnus viscidiflorus stenophyllus											
85	**66**	-	66	-	-	-	0	0	0	0	-/-
91	**266**	200	200	-	66	-	50	25	25	0	-/-
98	**0**	-	-	-	-	-	0	0	0	0	-/-
03	**0**	-	-	-	-	-	0	0	0	0	-/-
Juniperus osteosperma											
85	**66**	-	66	-	-	-	0	0	-	0	-/-
91	**133**	-	133	-	-	-	0	0	-	0	-/-
98	**100**	20	60	40	-	-	0	0	-	0	-/-
03	**100**	-	40	60	-	-	0	0	-	0	-/-
Opuntia whipplei											
85	**66**	-	66	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	0	6/8
03	**0**	-	-	-	-	-	0	0	-	0	-/-
Pinus edulis											
85	**66**	-	66	-	-	-	0	0	-	0	-/-
91	**66**	-	66	-	-	-	0	0	-	0	-/-
98	**20**	-	20	-	-	-	0	0	-	0	-/-
03	**20**	-	20	-	-	-	0	0	-	0	-/-

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Purshia tridentata											
85	**1465**	1200	466	866	133	-	23	59	9	0	35/28
91	**1199**	266	200	333	666	-	33	56	56	11	26/30
98	**1440**	100	100	1200	140	100	57	3	10	0	41/53
03	**1080**	20	60	380	640	40	22	76	59	13	38/47